B.A. Economics

Class: B.Sc(Non Medical/Computer Science/Economics)/B.A

Course: Algebra   Semester: I

Course Objectives:

The course on Algebra deals with advance topics on matrices viz. rank, eigen values, eigen vectors and homogeneous and non homogeneous systems, solution of cubic and bi-quadratic equations.

Course Outcomes:

A. **Knowledge and Understanding:**

- Understand all basic fundamentals of Matrices and vectors

- Learn to find rank of a matrix.

- Learn to solve linear system of equations (homogeneous and non homogeneous)

- Increasing Knowledge of the basic concepts of equations.

- Aware of a variety learning aids that can be used in the teaching of solving equations.

- Know how to transform the equation.

- Understand to solve cubic and bi-quadratic equations using cardon , Descarte and Ferrari's method.

B. **Intellectual(cognitive/Analytical) skills:**

- Use the basic concepts of matrix algebra and vector, including linear dependence/independence, rank and nullity, for analysis of matrices and systems of linear equations.

- Use the characteristic polynomial to compute the eigen values and eigen vectors of a square matrix and use them to diagonalise matrices when this is possible; discriminate between diagonalizable and non- diagonalizable matrices.

- Orthogonally diagonalise symmetric matrices and quadratic forms.

C. **General skills:**

- Use questioning and explanation strategies to help students learn new concepts and to support students in their problem solving activities.
- Apply mathematical methods involving arithmetic, algebra to solve problems.
- Represent mathematical information and communicate mathematical reasoning symbolically and verbally.

Course : Micro Economics

B.A. Semester: I

Objectives of the course: The purpose of Micro Economics is to give students a thorough understanding of the principles of Economics that apply to the decisions of individuals – both consumers and producers within the larger economic system after evaluating resources, costs and tradeoffs.

Course Outcomes:

A) **Learning outcomes:**
- Develop the ability to explain core economic terms, concepts and theories (explain the function of market and prices as allocative mechanisms, apply concepts of equilibrium, identify and discuss the key concepts underlying comparative advantage, identify and explain major types of market failures.)
- Demonstrate the ability to employ the "economic way of thinking" (discuss the application of marginal analysis, explain the use of benefit /cost analysis, explain the contribution of economics to the analysis of non-market social issues.)
- Demonstrate awareness of global historical, and institutional forces (assess the role of domestic and international institutions and norms in shaping economics.)
- Apply economic theories and concepts to contemporary social issues as well as formulation and analysis of policy (describe how economic trade-offs and social values impact public/private social policy, and the success or failure of policies to achieve intended outcomes.)

- Recognize the role of ethical values in economic decisions (distinguish between normative and positive economics, identify the limits of economic analysis, compare and contract efficiency and equity.)

B) Knowledge and understanding: Students

- Have knowledge to develop conceptual models of behaviour to predict responses to changes in policy and market conditions and can investigate these changes.
- Have knowledge to make decisions in everyday life like desirability of a particular financial investment opportunity, impact of public policies on healthcare or higher minimum wage etc.
- Have knowledge and understanding about economic institutions and various applied areas of economics.

C) Intellectual (Cognitive/ Analytical) Skills: Students

- Have deeper understanding of economic theory and have the opportunity to apply economic principles to a number of areas including finance, urban economics, labour economics, agricultural economics, public finance and international trade.

D) Practical skills: Students

- Have ability to use the analytical tools of economics in problem solving
- Have expertise to the analysis of data.
- Have reliable claims about the likely future path of the economy.

E) Transferable skills: Students will develop transferable skills of

- Communication – to present finding and explain complex data.
- Numeracy – to handle complex data and apply mathematical and statistical analytical methods.
- Problem solving – to extract information, draw conclusions and make recommendations.

Course Name: Indian Economy

Programme: B.Sc (Economics), B.A. **Semester**: II

Objective of the course:-

This course aims at informing about:

1. Indian economic growth, distribution and structural change: Comparative historical perspective

2. Planning for economic development: Changing contours of state and market in India

3. Poverty and inequality

4. WTO

5. Foreign Trade in India

6. Indian Taxation Structure

7. Indian Agriculture and Indian Industries

Course Outcomes:-

1. **Knowledge and understanding**:- Students will know the structure and state of Indian economy, emerging challenges for economy, different sectors and sectoral growth. Students will get the knowledge of reasons for slow growth, problems of the sectors and different solution strategies.
2. **Intellectual Skills:-**Students will identify the situation of Indian Economy, better evaluate and understand the data and problems related to different indicators of growth of countries economy. Students will intellectually search solutions for different types of problem of whole economy.
3. **Practical Skills**:-Dealing with different types of data and problems of economy, students will become aware of state problems. They can be evaluated the solutions, paths for development of the economy.

4. **Transferable Skills**:-Students will able to analysis the data and economy and can apply any quantitative research technique to evaluate economy growth, different sector contribution and role of different sectors in the growth of any other economy.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A

Course: Calculus II   **Semester: II**

Course Objectives:

This course introduces the student to integral calculus with the techniques of integration and application of integration to physical problem.

Course Outcomes:

A. **Knowledge and Understanding:**
- Extend the concept of integrals to a variety of applications, establishing several integration
- Use a variety of mathematical techniques to evaluate integrals
- Develop problem solving skills through diverse applications of the integral
- Analyze the parameterization of curves and the polar coordinate system

B. **Intellectual(cognitive/Analytical) skills:**

- Examine various techniques of integration and apply them to definite and improper integrals,
- Approximate definite integrals using numerical integration techniques and solve related problems,
- Model physical phenomena using partial differential equations,-
- Compute limits of, differentiate, integrate and solve related problems involving functions represented parametrically or in polar coordinates,

- Differentiate, and integrate functions represented using power series expansions, including Taylor series, and solve related problems.

C. Practical skills:

Students will be able to:
- Evaluate iterated integrals and switch the order of integration.
- Find volumes of solids by calculating appropriate double integrals in rectangular and polar coordinates.
- Find surface area using a double integral.
- Evaluate triple integrals and use them to find volumes in rectangular, cylindrical and spherical coordinates.
- Use a Jacobian to make a change of variables in a double integral.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A
Course: Calculus and Differential equations II   Semester: II

Course Objectives:

This course provides an introduction to topics involving calculus and ordinary differential equations. Both Calculus and Differential equations have applications in all areas of applied Sciences and engineering. Upon completion, students will be able to understand the applications of differential and integral calculus and also demonstrate understanding of the theoretical concepts and select and use appropriate techniques for finding solutions to differential equations.

Course Outcomes:

A. Knowledge and Understanding:

-Write the definition of indefinite and definite integrals.

-Define the integral of the inverse trigonometric and hyperbolic functions.

-State the Fundamental theorem of calculus

-Find general solutions to first order, second order and higher order homogeneous and non-homogenous differential equations with constant and variable coefficients.

-find the series solution of differential equation

B. Intellectual(cognitive/Analytical) skills:

-Evaluate Indefinite integral involving hyperbolic functions and Definite integral of all the functions.

-Sketch the graph of curves (Cartesian and parametric co-ordinates)

-Calculate areas of plane regions and arc length.

- Select and apply appropriate methods to solve differential equations.

-Apply power series method to find solution of Differential equations involving Bessel and Legendre equations.

- Use fundamental theorem of calculus to evaluate integral involving algebraic and transcendental functions.

C. Practical skills:

-Present mathematics to others, both in oral and written form clearly and in a well organized manner.

- Have the ability to carry out complex calculations orally and mentally.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A

Course: Analysis Semester: III

Course Objectives:

The aims of this course are to develop an understanding of convergence in its simplest setting to explain the difference between the sequence and series in the mathematical context to lay foundations for further investigation of infinite processes, in particular differential and integral calculus.

Learning outcomes:

A. Knowledge and Understanding:

Students will have

- An ability to work within an axiomatic framework.

- Knowledge of some simple technique for testing the convergence of sequences and series and confidence in applying them.

- An understanding of how the elementary functions can be defined by power series with an ability to deduce some of their easier properties.

B. Intellectual(cognitive/Analytical) skills:
- Express correctly the definitions of basic concepts from the course unit, for example the definition of the limit of a sequence.

- Decide on the correctness or otherwise of statements involving the basic concepts from the course unit, providing justifications or counter examples as appropriate.

C. Practical skills:

- Decide on convergence or divergence a wide class of series of real numbers or power series with real coefficient.

- A detailed understanding of how Cauchy's criterion for the convergence of real sequences and series follows from the completeness for R and the ability to explain the steps in standard mathematical notation.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A
Course: Analytical Geometry Semester: III
Course Objectives:
The aim of this course is to introduce the geometry of lines and conics in the Euclidean plane. Students can develop geometry with a degree of confidence and will gain fluency in the basics of Euclidean geometry. In this course, foundational mathematical training is also pursued. Curves studied include straight lines, ellipse, parabolas, hyperbolas and sphere. The course assumes a sound background in algebra, geometry and trigonometry.
Course Outcomes:
 Knowledge and Understanding:

Students will be able to:

- Parameterize curves.

- Evaluate the distance and angle.

- Sketch conic sections.

- Identify conic sections.
- Classify quadratic equations.

☐ Intellectual (cognitive/Analytical) skills:

On completion of this module, students should be able to:

- Establish rectangular coordinate system in the plane and in the space, express concept of vector both geometrically and analytically, understand operations on vectors and the properties of these operations.
- Estimate polar equations of conics and their graphs.
- Study of conics like ellipse, parabola and hyperbola.
- Express condition of parallel or perpendicular of the two lines.

Practical skills:
- Define conics and draw the graphs of conics such as ellipse, hyperbola, parabola and ellipse.

- Use the polar coordinate system, relate it to the rectangular coordinate system and graph equations using polar coordinates.

- Model real world situations with equations of conics.

- Determine equation of curves when given information that determines the curve.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A
Course: Statics and Vector Calculus Semester: IV
Course Objectives:

This Course introduces the student to review vector arithmetic, distinguish point and vectors, relate geometric concepts to their algebraic representation, describe point, line, and planes, use the dot product and cross product and their applications in Graphics. In Statics, we deal with equilibrium of bodies under action of forces (bodies may be either at rest or move with a constant velocity)

Course Outcomes:

A. Knowledge and Understanding:

Students will be able to:

- Identify conservative vector fields.

- Find the divergence and curl of a vector field.

- Evaluate line integrals of curves and vector fields.

- Use Green's theorem to evaluate line integrals.

- Gradient vector fields and constructing potentials

B. Intellectual(cognitive/Analytical) skills:

On completion of this module, students should be able to:

a) calculate vector and scalar derivatives of vector and scalar fields using the grad, div and curl operators in Cartesian and in cylindrical and spherical polar coordinates; b) Use suffix notation to manipulate Cartesian vectors and their derivatives; c) calculate multiple integrals in two and three dimensions including changing variables using Jacobians. d) Calculate line and surface integrals and use the various integral theorems.

Undertake the analysis of symmetric beams under vertical loads and torsion of cylindrical shafts

C. **Practical skills:**

- The integral ideas of the functions defined including line, surface and volume integrals - both derivation and calculation in rectangular, cylindrical and spherical coordinate systems and understand the proofs of each instance of the fundamental theorem of calculus.

- Examples of the fundamental theorem of calculus and see their relation to the fundamental theorems of calculus in calculus leading to the more generalised version of Stokes' theorem in the setting of differential forms.

- The differential ideas of divergence, curl, and the Laplacian along with their physical interpretations, using differential forms or tensors to represent derivative operations.

Course Name: International Economics and Public Finance

Programme : B.A / B.Sc. (Economics) Semester :IV

Objectives of the course:

This course aims at making students understand the meaning and importance of international trade. Students will be able to distinguish between fixed and flexible exchange rates and reasons of fluctuation in these rates. Students will also be made to understand the meaning and components of balance of payments. Students will understand about taxation, public debt ,public expenditure etc.

Course Outcomes:

Knowledge and understanding:

Students will

Know how to define various elements of international trade.

Understand and explain the basic concepts associated with international trade and public finance.

Intellectual skills

Students will be able to

Define various terms related to international Economics and public finance.

Think critically about the different theories of international trade

Practical skills

Students will learn to:

Draw diagrams to show relations between different variables

Analyze the actual situation of country's trade , BOP ,exchange rates , taxes , public expenditure etc.

Quantitative Methods for Economists

Programme: B.Sc. Economics/B.A.   **Semester**:   VI

Objective of the course:-

This course aims at provide students the knowledge of statistical and mathematical techniques to analysis data. It enabled the students to use these methods as a tool in government, private business firms and research agencies. These statistical methods are used in forecasting, controlling and exploring data.

Course outcomes:-

1. **Knowledge and understanding: -** Students will understand the scope and categories of the subjects. Students will know the techniques of data collection and the techniques and methods to apply and evaluate the result of economic variables and their relationships.
2. **Intellectual Skills:-**Students will able to understand and apply the methods to test the validity of economic theories. They can further use the techniques for research purpose. They can also forecast the future values. Students can get the knowledge of techniques that is how to apply different techniques and different formulas and their applicability on different types of data.
3. **Practical Skills**: - Students will be familiar with Quantitative methods and their application on economic variables. Students will familiar with different techniques and able to use these techniques to analysis any applicable dimension of economic theory and variable.
4. **Transferable Skills**:-Students will able to analysis the data and economy and can apply any quantitative research technique. They will be able to use stastiscal and mathematical

techniques for economic variables for evaluation, to test validity of economic theory and forecast future values.

Class: B.Sc.(Non Medical/Computer Science/Economics)/B.A

Course: Dynamics Semester: V

Course Objectives:

This course aims to equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems and vibrations. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to have given motions and analyze forces in machines.

Learning outcomes:

A. Knowledge and Understanding:

Students will be able to

- Understand the set of physical laws, describing the motion of bodies, under the influence of system of forces.

- Understand and use basic terms for the description of the motion of particles, vector functions and the fundamental laws of Newtonian mechanics.

- Solve mechanics problems in one dimension that involve one or more of the forces of gravity, friction and air resistance.

- understand the concept of terminal speed, and use it in solving mechanics problems in one dimension

B. Intellectual(cognitive/Analytical) skills:

- Analyze the applications of mathematics to the problems in physics & develop suitable mathematical method for such application.

- Solve problems relating to the motion of a projectile in the absence of air resistance

C. Practical skills:

- Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
- Solve mechanics problems in one dimension that involve one or more of the forces of gravity, friction and air resistance.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A

Course: Number theory Semester: V

Course Objectives:

The objective of this course is the study of basic structure and properties of integers. Learning number theory helps improving one's ability of mathematical thinking. The objectives for this course are to expose students to this beautiful theory, to understand what inspired this quote from Gauss and to allow students to experience mathematics as a creative, empirical science.

Learning Outcomes:

A. Knowledge and Understanding:

Students will be able to

- Explore the use of arithmetical functions, the Mobius function and the Euler totient function.

- Solve systems of linear congruences with different moduli using the Chinese Remainder Theorem.

- Prove results involving divisibility and greatest common divisors.

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B. Intellectual(cognitive/Analytical) skills:

- Enchance and reinforce the student's understanding of concepts through the use of technology when appropriate.

- Apply Euler-Fermat's Theorem to prove relations involving prime numbers.

C. General skills:

- Analyze the structure of real-world problems and plan solution strategies.

- Communicate quantitative data verbally, graphically, symbolically and numerically.

- Use mathematical concepts in problem-solving through integration of new material and modeling.

Subject: Development Economics

Class: B.Sc. Economics Semester – V

Course outcomes:

A) Learning outcomes:

☐ Develop the ability to explain core economic terms, concepts and theories related to development of an economy.

☐ Demonstrate the ability to employ different policies to realize the growth objectives.

B) Knowledge and understanding: Students

☐ Have knowledge of conceptual models of Economic Development.

☐ Have knowledge to policy determinants in the development of an economy.

C) Intellectual (Cognitive/ Analytical) Skills: Students

☐ Have deeper understanding of economic situation of an economy on different parameters and variables, and have the opportunity identify the relationship between the different economic variables for further used for policy making.

D) Practical skills: Students

☐ Have ability to use the development parameters to accelerate the growth of an economy.

☐ Have expertise to the analysis the development level of the different economies.

☐ Can gain knowledge related to different policies to develop the economy.

E) Transferable skills: Students will develop transferable skills of

☐ Can develop the development policy under different economic problems.

☐ Can compare the data and different development indexes of the world economies.

Course Name: Quantitative Methods for Economists

Programme: B.Sc. Economics/B.A. **Semester**: VI

Objective of the course:-

This course aims at provide students the knowledge of statistical and mathematical techniques to analysis data. It enabled the students to use these methods as a tool in government, private

business firms and research agencies. These statistical methods are used in forecasting, controlling and exploring data.

Learning outcomes:-

1. **Knowledge and understanding: -** Students will understand the scope and categories of the subjects. Students will know the techniques of data collection and the techniques and methods to apply and evaluate the result of economic variables and their relationships.

2. **Intellectual Skills:-**Students will able to understand and apply the methods to test the validity of economic theories. They can further use the techniques for research purpose. They can also forecast the future values. Students can get the knowledge of techniques that is how to apply different techniques and different formulas and their applicability on different types of data.

3. **Practical Skills**: - Students will be familiar with Quantitative methods and their application on economic variables. Students will familiar with different techniques and able to use these techniques to analysis any applicable dimension of economic theory and variable.

4. **Transferable Skills**:-Students will able to analysis the data and economy and can apply any quantitative research technique. They will be able to use stastiscal and mathematical techniques for economic variables for evaluation, to test validity of economic theory and forecast future values.

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A

Course: Numerical Analysis Semester: VIth

Course Objectives:

This course aims to provide a first approach to the subject of algebra, which is one of the basic pillars of modern mathematics. The focus of the course will be the study of certain structures called groups, rings, fields and some related structures. Abstract algebra gives to student a good mathematical maturity and enables to build mathematical thinking and skill.

Course Outcomes:

A. Knowledge and Understanding:

Students will know how

- Solve an algebraic or transcendental equation using an appropriate numerical method.

- Approximate a function using an appropriate numerical method.

- solve a differential equation using an appropriate numerical method

- evaluate a derivative at a value using an appropriate numerical method

- code a numerical method in a modern computer language

B. Intellectual(cognitive/Analytical) skills:

- Derive numerical methods for approximating the solution of problems of continuous mathematics,

- Analyze the error incumbent in any such numerical approximation,

- Implement a variety of numerical algorithms using appropriate technology.

- Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation.

- And approximation, numerical differentiation and integration, solution of linear systems.

C. Transferable skills:

- solve a linear system of equations using an appropriate numerical method

- Problem solving and Analytical skills

- Be able to develop numerical literacy

- Social responsibility and global citizenship skills

Class: B.Sc. (Non Medical/Computer Science/Economics)/B.A
Course: Linear Algebra Semester: VI
Course Objectives:
Algebraic structures -- such as groups, rings, and fields -- are pervasive in mathematics. This course focuses on (commutative) rings, which are sets equipped with two (commutative) operations (called addition and multiplication), and that contain an additive identity and an additive inverse for each element of the set. A fundamental example of a ring is $\mathbf{Z}$, the set of

integers; other important examples include **Q**, **Z** modulo n, and **Q**[X], which is the set of polynomials in X with rational Coefficients.

Course Outcomes:

A. Knowledge and Understanding:

Students will be able to

- Develop an understanding of linear algebra in mathematics, natural and social sciences.

- Use matrix algebra to analyze and solve equations arising in many applications that require a background in linear algebra.

- Utilize vector space terminology and describe how closely other vector spaces resemble Rn.

B. Intellectual(cognitive/Analytical) skills:

- Demonstrate factual knowledge of the fundamental concepts of spanning, linear independence, and linear transformations.

- Acquire communication and organizational skills, including effective written communication in their weekly assignments.

- Use visualization, spatial reasoning as well as geometric properties and strategies to mode, solve problems and view solutions especially in R2 and R3.

C. General skills:

- Apply mathematical methods involving arithmetic, algebra, geometry and graphs to solve problems.

- Represent mathematical information and communicate mathematical reasoning symbolically and verbally.

- Interpret and analyze numerical data, mathematical concepts and identify patterns to formulate and validate reasoning.

Subject: Q.T.(Econometrics)

Class: B.Sc. Economics Semester – VI

Course outcomes:

5. **Learning outcomes**:

☐ Develop the ability to evaluate and can learn to apply different econometrics techniques.

☐ Develop the ability to forecast the economic situation based on the data.

6. **Knowledge and understanding:**

☐ Students will understand the scope and categories of the subjects.

☐ Students will know the techniques of data collection and models of econometrics to apply and evaluate the result of economic variables and their relationships

7. **Intellectual Skills:**

☐ Students will able to understand and apply the model to test the validity of economic theories, quantitative and qualitative and further can use the models for research purpose. They can also forecast the future values.

8. **Practical Skills**:

☐ Students will be familiar with econometrics problems

☐ detection tests for detecting the econometrics problem,

☐ Consequences of econometrics problems and remedial measures to remove the emerging problem.

☐ Students will familiar with different techniques and able to use these techniques to analysis any applicable dimension of economic variables.

9. **Transferable Skills**:

Students will able to analysis the data and economy and can apply any quantitative research technique.

 They will be able to use econometrics techniques for economic variables for evaluation, to test validity of economic theory and magnitude, and predict the future values